

IN THE CLAIMS:

Please amend claims 38, 52, 55, 57, 71, 74, and 75; and
add new claims 76-78 as follows.

Claims 1-37. (Cancelled)

38. (Currently Amended) An apparatus, comprising:

a plurality of receiving elements each of which is configured to receive a
composite signal including at least some of a plurality of signals, wherein the apparatus
receives said plurality of signals at the same time; and

a processor configured to receive said plurality of receiving elements composite
signal and providing an estimate of at least two of said plurality of signals, said processor
is configured to provide an estimate of a first one of said signals and to provide an
estimate of a second one of said signals, wherein said processor is configured, for each
already determined estimate of at least one of the estimate of the first one of said signals
and the estimate of the second one of said signals, to extend ~~the estimate~~ each of the at
least one already determined estimate with a plurality of potential values, wherein said
estimate of said second one of said signals takes into account the estimate of the first
signal and the estimate of the first signal is modified in dependence on the estimate of the
second signal.

39. (Previously Presented) The apparatus as claimed in claim 38, wherein said processor is configured to provide an initial estimate of said plurality of signals, said processor using said initial estimate as a first value for said first and second estimates.

40. (Previously Presented) The apparatus as claimed in claim 38, wherein said processor is configured to provide an estimate of at least three signals and the estimate of each successive signal takes into account the previously determined signal estimates.

41. (Previously Presented) The apparatus as claimed in claim 38, wherein said processor is configured to provide an estimate of at least three signals and any one or more of the previously determined estimated can be modified in dependence on a current signal estimate.

42. (Previously Presented) The apparatus as claimed in claim 38, wherein said processor is configured to determine the order in which the signals are estimated.

43. (Previously Presented) The apparatus as claimed in claim 42, wherein said processor is configured to determine the order in which the signals are estimated taking into account at least one of received signal level and signal to noise ratio.

44. (Previously Presented) The apparatus as claimed in claim 38, wherein said potential values comprise constellation points.

45. (Previously Presented) The apparatus as claimed in claim 44, wherein said estimate is extended by every possible constellation point.

46. (Previously Presented) The apparatus as claimed in claim 38, wherein said plurality of potential values comprise potential values for a currently estimated signal.

47. (Previously Presented) The apparatus as claimed in claim 38, wherein a metric is determined for the extended estimates.

48. (Previously Presented) The apparatus as claimed in claim 47, wherein at least some of said extended estimates are discarded in dependence on the determined metric.

49. (Previously Presented) The apparatus as claimed in claim 47, wherein one or more existing estimates are discarded if a determined metric is better than that of said one or more existing estimates.

50. (Previously Presented) The apparatus as claimed in claim 47, wherein said metric is based on a function of the currently determined estimates and the received signal.

51. (Previously Presented) The apparatus as claimed in claim 50, wherein said function is a squared Euclidean distance between said currently determined estimates and the received signal.

52. (Currently Amended) An apparatus, comprising:

a plurality of receiving elements each of which is configured to receive a composite signal including at least some of a plurality of signals, wherein the apparatus receives said plurality of signals at the same time; and

a processor configured to receive said plurality of receiving elements composite signal and providing an estimate of at least two of said plurality of signals, said processor is configured to provide an estimate of a first one of said signals and to provide an estimate of a second one of said signals, wherein said processor is configured, for each already determined estimate of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals, to extend ~~the~~ each of the at least one already determined estimate with a plurality of potential values, wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal is modified in dependence on the estimate of the second signal,

wherein a metric is determined for the extended estimates and wherein said metric is calculated for a signal estimate at least partially from metric values stored during the calculation of a previously determined estimate.

53. (Previously Presented) The apparatus as claimed in claim 38, wherein said processor is configured to treat those signals for which an estimate has not yet been determined as noise.

54. (Previously Presented) The apparatus as claimed in claim 38, wherein the processor is configured, before determining any estimates to calculate at least one of:

- the matrix product of the channel transfer function multiplied by itself;
- the squared length of the channel impulse response for at least one signal received by at least one receiving element; and
- an inner function defined by the received signal multiplied by the channel impulse response.

55. (Currently Amended) An apparatus, comprising:

- a plurality of receiving elements each of which is configured to receive a composite signal including at least some of a plurality of signals, wherein the apparatus receives said plurality of signals at the same time; and

a processor configured to receive said plurality of receiving elements composite signal and providing an estimate of at least two of said plurality of signals, said processor is configured to provide an estimate of a first one of said signals and to provide an estimate of a second one of said signals, wherein said processor is configured, for each already determined estimate of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals, to extend each of the at least one already determined the estimate with a plurality of potential values, wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal is modified in dependence on the estimate of the second signal, wherein for each estimate, quantities

$$\|r-H(v_s+v_e)\|^2, \|r-Hv_s\|^2, 2\Re\{(c_k-\hat{c}_k)^*(e_k^H H^H H v_s - h_k^H r)\}, |c_k-\hat{c}_k|^2 \|h_k\|^2$$

are calculated.

56. (Previously Presented) The apparatus as claimed in claim 38, wherein said receiving elements comprise antennas.

57. (Currently Amended) A method, comprising:
receiving a plurality of signals at the same time;
receiving at each of a plurality of receiving elements a composite signal including at least some of said plurality of signals; and

processing said composite signal of each of said received plurality of receiving elements to provide an estimate of at least two of said plurality of signals,

said processing comprising

providing an estimate of a first one of said signals and providing an estimate of a second one of said signals wherein during said processing, and

extending, ~~for each already determined estimate of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals, the~~ estimate with a plurality of potential values,

wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal modified in dependence on the estimate of the second signal.

58. (Previously Presented) A method as claimed in claim 57, wherein said processing further comprises

providing an initial estimate of said plurality of signals, said processing using said initial estimate as a first value for said first and second estimates.

59. (Previously Presented) A method as claimed in claim 57, wherein said processing further comprises

providing an estimate of at least three signals and the estimate of each successive signal taking into account the previously determined signal estimates.

60. (Previously Presented) A method as claimed in claim 57, wherein said processing further comprises

providing an estimate of at least three signals and any one or more of the previously determined estimates modified in dependence on a current signal estimate.

61. (Previously Presented) A method as claimed in claim 57, wherein said processing further determines an order in which the signals are estimated.

62. (Previously Presented) A method as claimed in claim 61, wherein said processing further comprises

determining the order in which the signals are estimated taking into account at least one of received signal level and signal to noise ratio.

63. (Previously Presented) A method as claimed in claim 57, wherein said potential values comprise constellation points.

64. (Previously Presented) A method as claimed in claim 63, wherein said estimate is extended by every possible constellation point.

65. (Previously Presented) A method as claimed in claim 57, wherein said plurality of potential values comprise potential values for a currently estimated signal.

66. (Previously Presented) A method as claimed in claim 57, wherein a metric is determined for the extended estimates.

67. (Previously Presented) A method as claimed in claim 66, further comprising: discarding at least some of said extended estimates in dependence on the determined metric.

68. (Previously Presented) A method as claimed in claim 66, further comprising: discarding one or more existing estimates if a determined metric is better than that of said one or more existing estimates.

69. (Previously Presented) A method as claimed in claim 66, wherein said metric is based on a function of the currently determined estimates and the received signal.

70. (Previously Presented) A method as claimed in claim 69, wherein said function is a squared Euclidean distance between said currently determined estimates and the received signal.

71. (Currently Amended) A method, comprising:

receiving a plurality of signals at the same time;

receiving at each of a plurality of receiving elements a composite signal including at least some of said plurality of signals; and

processing said composite signal of each of said received plurality of receiving elements to provide an estimate of at least two of said plurality of signals,

said processing comprising

providing an estimate of a first one of said signals and providing an estimate of a second one of said signals wherein during said processing, and

extending, ~~for each already determined estimate~~ of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals, ~~the estimate~~ with a plurality of potential values,

wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal modified in dependence on the estimate of the second signal, wherein a metric is determined for the extended estimates and wherein said metric is calculated for a signal estimate at least partially from metric values stored during the calculation of a previously determined estimate.

72. (Previously Presented) A method as claimed in claim 57, wherein the processing treats those signals for which an estimate has not yet been determined as noise.

73. (Previously Presented) A method as claimed in claim 57, wherein the processing further comprises, prior to the determining of any estimates, calculating at least one of:

the matrix product of the channel transfer function multiplied by itself;

the squared length of the channel impulse response for at least one signal received by at least one receiving element; and

an inner function defined by the received signal multiplied by the channel impulse response.

74. (Currently Amended) A method, comprising:

receiving a plurality of signals at the same time;

receiving at each of a plurality of receiving elements a composite signal including at least some of said plurality of signals; and

processing said composite signal of each of said received plurality of receiving elements to provide an estimate of at least two of said plurality of signals,

said processing comprising

providing an estimate of a first one of said signals and providing an estimate of a second one of said signals wherein during said processing, and

extending, ~~for each already determined estimate of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals, the~~ estimate with a plurality of potential values,

wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal modified in dependence on the estimate of the second signal, wherein for each estimate, quantities

$$\|r-H(v_s+v_e)\|^2, \|r-Hv_s\|^2, 2\Re\{(c_k-\hat{c}_k)^*(e_k^H H^H H v_s - h_k^H r)\}, |c_k-\hat{c}_k|^2 \|h_k\|^2$$

are calculated.

75. (Currently Amended) An apparatus, comprising:

plurality of receiving element means each for receiving a composite signal including at least some of a plurality of signals, wherein the apparatus receives said plurality of signals at the same time; and

processing means for receiving said plurality of receiving element composite signal and providing an estimate of at least two of said plurality of signals, said processing means providing an estimate of a first one of said signals and providing an estimate of a second one of said signals, wherein said processing means, for each already determined estimate of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals, ~~for extending the estimate~~ with a plurality of potential values, wherein said estimate of said second one of said signals takes into

account the estimate of the first signal and the estimate of the first signal modified in dependence on the estimate of the second signal.

76. (New) A computer program embodied on a computer readable medium, said computer program configured to control a processor to perform:

processing a composite signal of each of a received plurality of signals received by a plurality of receiving elements to provide an estimate of at least two of said plurality of signals,

said processing comprising

providing an estimate of a first one of said signals and providing an estimate of a second one of said signals wherein during said processing, and

extending, for each already determined estimate of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals with a plurality of potential values,

wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal modified in dependence on the estimate of the second signal.

77. (New) A computer program embodied on a computer readable medium, said computer program configured to control a processor to perform:

processing a composite signal of each of a received plurality of signals received by a plurality of receiving elements to provide an estimate of at least two of said plurality of signals,

said processing comprising

providing an estimate of a first one of said signals and providing an estimate of a second one of said signals wherein during said processing, and

extending, for each already determined estimate of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals with a plurality of potential values,

wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal modified in dependence on the estimate of the second signal, wherein a metric is determined for the extended estimates and wherein said metric is calculated for a signal estimate at least partially from metric values stored during the calculation of a previously determined estimate.

78. (New) A computer program embodied on a computer readable medium, said computer program configured to control a processor to perform:

processing a composite signal of each of a received plurality of signals received by a plurality of receiving elements to provide an estimate of at least two of said plurality of signals,

said processing comprising

providing an estimate of a first one of said signals and providing an estimate of a second one of said signals wherein during said processing, and

extending each already determined estimate of at least one of the estimate of the first one of said signals and the estimate of the second one of said signals with a plurality of potential values,

wherein said estimate of said second one of said signals takes into account the estimate of the first signal and the estimate of the first signal modified in dependence on the estimate of the second signal, wherein for each estimate, quantities

$$\|r-H(v_s+v_e)\|^2, \|r-Hv_s\|^2, 2\Re\{(c_k-\hat{c}_k)^*(e_k^H H^H H v_s - h_k^H r)\}, |c_k-\hat{c}_k|^2 \|h_k\|^2$$

are calculated.